

**STUDENT AWARDS FOR RESEARCH AND CREATIVITY  
(SARC) APPLICATION**

**Application for Summer 2022 Award DUE BY 5pm, Friday, March 11, 2022**

**Application Instructions:**

1. Identify a faculty sponsor of your research or creative project who will write a letter of recommendation in support of the application. Letter of Recommendation must be submitted by 5pm, Friday, March 11, 2022.
2. Submit application and supporting documentation online at: <https://www.csuchico.edu/ued/student-awards/index.shtml>

**\*\*IMPORTANT\*\***

Applications or references submitted after Friday, 5:00pm, on the day of the deadline will not be considered.

Full Name: Alina Tichinin

Cumulative GPA: [REDACTED]

CSU ID# [REDACTED] Major(s): Anthropology

Expected Graduation Date: [REDACTED]

Mailing Address: [REDACTED]

[REDACTED]

(City) (State) (Zip Code)

Local Phone: [REDACTED]

Research/Creative Project Title: A Multi-Technique Approach to Seasonal Big Game Reliance and Centra

Award Requested (choose one): Summer Award (Graduate)

Amount requested: \$5,000

- Spring Award, Undergraduate (\$850 maximum award)
- Spring Award, Graduate (\$1700 maximum award)
- Summer Award, Undergraduate (\$2500 maximum award)
- Summer Award, Graduate (\$5000 maximum award)
- Fall Award, Undergraduate (\$850 maximum award)
- Fall Award, Graduate (\$1700 maximum award)

Will applicant be funded by any other source during the period of the project?  
(If yes, details and amounts should be specified in the narrative description.)

Has applicant received a SARC award before?  
(If yes, faculty sponsor must request and receive special permission prior to the student application)

Has applicant applied for a SARC award before?

Chico State email address: [REDACTED]

Faculty Sponsor name: [REDACTED]

Faculty Sponsor email address: [REDACTED]

Applicant Signature [REDACTED]

Date: 3/8/2022

## **A Multi-Technique Approach to Seasonal Big Game Reliance and Central Camp Locality in the Great Basin of Northwestern Nevada**

The project I will fund through the SARC Award applies the use of multiple investigative techniques to inform on human behavior surrounding prey acquisition in the Archaic to Terminal Prehistoric Periods (1450 to 4700 cal BP) in the northwestern Great Basin. I will use stable isotope analysis, cementum increment analysis, and radiocarbon dating on bighorn sheep teeth (*Ovis canadensis*) excavated from the Paiute Creek Shelter in Nevada's Black Rock Desert. The importance of bighorn sheep as a resource in Paiute ethnography is well documented (Stewart, 1939; Fowler and Liljeblad, 1986). This study will investigate the relationship between human mobility, resource depression, and impacts of climate change and seasonality at the Paiute Creek site. While providing a basis for further research into the dietary and mobility patterns in the region, successful combination of the three methods can also contribute to archaeological research methodology in the Great Basin, and in other contexts. Local Paiute communities were consulted as part of the Bureau of Land Management's tribal consultation responsibilities. The exploration of how multiple types of analyses can be done on just one skeletal element from an archaeological context demonstrates responsible practices considering indigenous communities' calls to conserve cultural material.

Stable isotope analysis is a technique that uses the ratios of different isotopes of various elements in body tissues to estimate dietary habits and mobility of an individual at a range of time periods throughout their life (Katzenberg, 2008). Isotopes of oxygen reflect the water values that are consumed by an individual, which can be used to estimate atmospheric and environmental isotope values that can be linked to seasonal variation based on rainfall patterns and altitude (Pilaar-Birch et al 2015). Strontium is a radiogenic isotope that records the signature of the underlying bedrock in a region, which is incorporated into the body, providing a proxy for location of habitation during the formation of a particular tissue (Fisher and Valentine, 2013). Cementum increment analysis was developed in biology to address season of death of mammals. Cementum is the bone-like tissue formed on the outside of the tooth root to secure the tooth to the periodontal ligament (Leigh, 1998). Cementum is laid down continuously, and seasonal changes in the orientation of the collagen fibers creates distinctive bands. These bands can be distinguished in a microscope slide cross-section as contrasting opaque and translucent layers on the external surface of the tooth root (Leigh, 1998). Winter is represented by the dark bands due to cessation of growth, and summer by light colored or transparent bands. Season of death is typically estimated by measuring the degree of growth of the outermost layer of cementum compared to the width of previous layers (Leigh, 1998; Lieberman, 1993).

The isotope data from this study will inform on the seasonal migration habits of the herds of bighorn in the Black Rock Desert region during the time of site occupation, and the cementum increment analysis will reveal the season during which bighorn were most often hunted. Using these datasets, we can attempt to correlate these histological changes with documented climatic variation in the region. Incongruous relationships with my data and climatic data may indicate resource depression: a decrease in prey population due to over-predation.

The SARC funding would largely go toward analysis of the isotope samples on a mass spectrometer. The 17 oxygen and 10 strontium samples will be analyzed at the UC, Davis Stable Isotope

Facility. The funds remaining would assist the acquisition of supplies for preparing the samples for analysis. A line-item list of costs is provided below.

This research project encompasses the data analysis I will use to complete my master’s thesis. I am in my third year of a three-year master’s program at CSU, Chico and my graduation and pursuit of further education relies on my ability to complete this project. The research design, sample preparation, data analysis, interpretation, and reporting will be done by me with the guidance of my thesis advisor, Dr. Matthew O’Brien. I will also be collaborating with the University of Nevada, Reno for access to the archaeological collection, and with Dr. Chris O’Brien of the U.S. Forest Service for guidance with cementum increment analysis.

SARC support provides the necessary financial requirements to complete my analysis, and I seek no funds to offset my personal time. I hope this demonstrates how important this work is to me, and the belief held by myself and my thesis committee, that this methodological approach can have a significant impact on how archaeology balances our pursuit of information about past lifeways while respecting the wishes of descendant communities. I am passionate about continuing in this field, and the ability to complete this project will be a vital steppingstone for my future career.

I plan to present this research at several academic conferences, including the 2022 Society for California Archaeology meeting and the 2022 Nevada Archaeological Association meeting. There is also the potential for additional publications if the project is funded.

This research contributes to the field of archaeology in two ways. On a niche level, this project provides insights into seasonal patterns in the Great Basin to contribute to understanding of the lifeways of ancient populations in this region. The results of this project will complement the debate within Great Basin archaeology about the timing and extent of the Numic expansion- a population shift in the region from a relatively ephemeral pre-Numic culture to the cultural group that inhabited the area until the ethnographic period. Changes in seasonal foraging or location of hunting might be indicative of changes in cultural groups, or changes in the environment. In a broader sense, this research can contribute to our understanding of the impacts of changing climatic conditions on cultures and how the Paiute adapted to such changes. In understanding past relationships with the environment, we can potentially find relevant knowledge for the present and future populations facing similar challenges.

**Project Budget**

<b>Materials</b>	<b>Cost</b>	<b>Units</b>	<b>Total</b>
Biotium ultrafiltration vials	\$50	12	600
<b>Analyses</b>			
Strontium (Sr)	\$100.00	10	1,000.00
Bone Apatite (C+O)	\$200.00	17	3,400.00
Sum Total:			5,000.00

## References Cited

- Fisher, Jacob and Benjamin Valentine. 2013. *Resource Depression, Climate Change, and Mountain Sheep in the Eastern Great Basin of Western North America*. *Archaeol Anthropol Sci* (5)145-157.
- Fowler, Catherine, and Sven Lilijeblad. 1986. *Northern Paiute*. In *Handbook of North American Indians*, Vol 11: Great Basin. Ed., W. L. d'Azevedo. Smithsonian Institution.
- Katzenberg, M. Anne, 2008. *Stable Isotope Analysis: A Tool for Studying Past Diet, Demography, and Life History*. In Biological Anthropology of the Human Skeleton. Eds M. Anne Katzenberg and Shelley R. Saunders. Wiley and Sons, Inc.
- Leigh, Anastasia. 1998. *Seasonality in Archaeological Faunal Assemblages: Applications of Cementum Increment Analysis to Deer From Northern California*. MA Thesis, CSU Chico.
- Lieberman, Daniel and Richard Meadow. 1992. *The Biology of Cementum Increments (With an Archaeological Application)*. *Mammal Review* (22).
- Pilaar Birch, SE, Preston Miracle, Rhiannon Stevens, Tamsin O'Connell. 2016. *Late Pleistocene/ Early Holocene Migratory Behavior of Ungulates Using Analysis of Tooth Enamel and Its Effects on Forager Mobility*. *PLoS ONE* 11(6).
- Stewart, Omer. 1938. *The Northern Paiute Bands*. University of California Press.